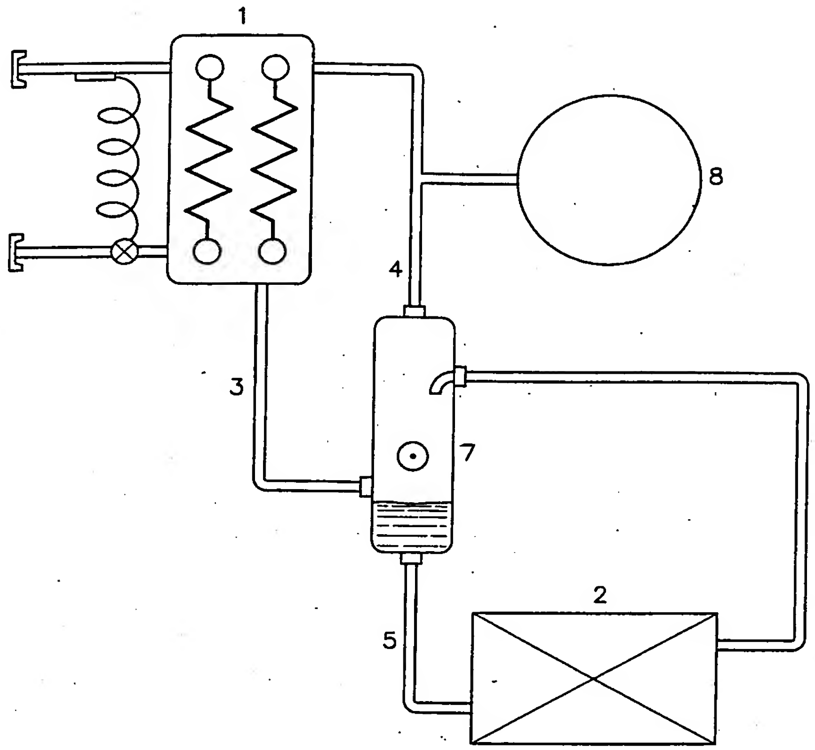
Carbon Dioxide Secondary Coolant System with Fade-Out Vessel

System Schematic:



Charge Analysis:

Properties @ +75°F, 450 Psig:

Vapor Density, ρ_{vapor}:	=	5.2	[Lb/Ft³]

Properties @ -20°F

Liquid Density, ρ_{liquid}:	=	66.86	[Lb/Ft³]
Vapor Density, ρ_{vapor}:	=	2.41	[Lb/Ft³]
Quality at 5.2 [Lb/Ft³]	=	0.43	(from P-h diagram)

ITEM #	COMPONENT DESCRIPTION	INTERNAL VOLUME [Ft³]		LIQUID CHARGE [Lbs.]
1	Heat Exchanger	0.117		1.96
2	Evaporator	0.109		3.64
3	3/8" Type L Copper Tube, 2' Long	0.0011		0.07
4	5/8" Type L Copper Tube, 2' Long	0.0032		0.00
5	3/8" Type L Copper Tube, 4' Long	0.0022		0.14
6	5/8" Type L Copper Tube, 4' Long	0.0065		0.00
7	Hill PHOENIX Liquid-Vapor Separator	0.0218		0.15
		0.261	Total Liquid R-744 Charge =	5.96

Total System Mass for above liquid mass and system density:	10.46	[Lb]
Required System Volume to hold total charge:	2.01	[Ft³]
Required Volume of Fade-Out Vessel:	1.75	[Ft³]

SIZING PROCESS ON PRESSURE ENTHALPY-DIAGRAM